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Design of Access Platforms for Offshore Windturbines

By Thomas Lykke Andersen &
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A large number of offshore windfarms have been constructed, more are currently under construction and many more are planned. Therefore, a lot of research is going on within the design of offshore windfarms and their foundation.

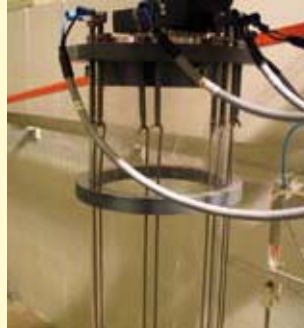
Aalborg University has lately investigated the wave run-up on a circular cylinder and the forces that the run-up generates on a horizontal platform and a conical platform using model tests. The tests have been carried out for DONG Energy as a part of the design of the foundations for the planned Horns Rev II windmill farm.

The background for the study is the observations from the Horns Rev I windmill farm, where the wave run-up height has been shown to be significantly larger than accounted for in the design. This has led to damage to some of the access platforms and boatlanding facilities. The logical approach might seem to be to place the platforms significantly higher, but for safety reasons this is not possible.

The objective for the model tests was to establish a design procedure to determine the impact pressures on the platforms, in the following three step procedure:

- 1) Calculate the expected maximum wave run-up height with no platform.
- 2) Use this run-up height to calculate the velocity at the level of the platform.
- 3) Use a slamming force model to get the maximum pressures.

Wave run-up has been measured in a small scale model using five water level gauges attached to the surface of the pile, cf. Fig. 1. The gauges were placed 2 mm from the surface of the pile and catch the green water run-up, but not spray which is mainly gener-



Measurement of wave run-up on pile.



Fig. 2: Measurement of impact pressures for horizontal platform.

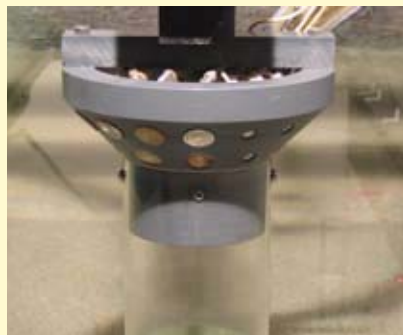


Fig. 3: Measurement of impact pressures for conical platform.

ated by breaking waves. These tests have been performed to calibrate step 1 and 2 in the design procedure.

Access platforms are typically horizontal, but the client comes up with a conical platform solution, as they expected significantly

smaller slamming forces for this structure. Therefore, both a horizontal platform and a conical platform were considered in step 3 of the design procedure. The slamming forces generated were measured by pressure cells as shown in Fig. 2 & 3.